

Appendix C

Federal Energy Research and Development Appropriations

The tables in this appendix (C1 through C4) document annual Federal energy research and development appropriations illustrated in Figures 2 through 6 in Chapter 3. The tables also document the allocation of Department of Energy budget line items into the programmatic groupings discussed in Chapter 3. Most of the data are taken from an internal appropriations tally maintained by the Office of the Chief Financial Officer within the Department of Energy. This tally is considerably more detailed than the budget presentations in the *Budget of the United States Government*. As in any data set, however, it is best to know exactly what is being measured. Thus, users of this data set should be aware of the following considerations:

- Data are for appropriations and not for outlays, with the exception of the Clean Coal Technology Program, for which both outlays and appropriations are shown.
- The appropriations shown are for final spending authority, after any subsequent reprogramming and supplemental appropriations have been made. Thus, the figures shown are not necessarily identical with the figures appropriated by the Congress in each year's budget. There were several instances of large-scale reprogramming of Departmental funds in the early 1980s.
- FY 1999 appropriations are estimated.
- The term "unallocated" is used to describe budget items that cannot be attributed to particular fuels or energy types. Much of this spending is administrative "overhead" within the Department of Energy and capital and operating costs of the national laboratories. However, because overhead costs have not been treated uniformly over time and are not treated uniformly by different offices within the Department of Energy, it is not possible to use these figures to ascertain what portion of research and development spending is actually devoted to overhead costs, nor to compare overhead spending across programs.

**Table C1. Summary of U.S. Department of Energy Research and Development Expenditures,
Fiscal Years 1978-1999**
(Million 1999 Dollars)

| Item | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|--------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Renewable Energy | 1,356.5 | 1,590.5 | 1,616.3 | 1,453.6 | 668.1 | 474.2 | 384.4 | 348.8 | 280.0 | 235.5 | 193.9 |
| Nuclear Power | 2,583.4 | 2,256.8 | 2,044.5 | 1,815.9 | 1,765.4 | 1,614.0 | 1,140.4 | 886.5 | 849.2 | 772.8 | 693.5 |
| Fossil Energy | 1,716.4 | 1,732.7 | 1,602.4 | 1,414.9 | 921.6 | 484.9 | 497.4 | 507.7 | 482.0 | 411.0 | 465.5 |
| Conservation and End Use | 388.3 | 472.6 | 557.6 | 505.5 | 247.0 | 210.1 | 225.6 | 255.0 | 245.7 | 220.4 | 205.4 |
| Clean Coal Technology | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 9.5 | 33.9 |
| Total | 6,044.5 | 6,052.6 | 5,820.8 | 5,189.9 | 3,602.2 | 2,783.1 | 2,247.8 | 1,998.1 | 1,857.3 | 1,649.3 | 1,592.2 |

Sources: U.S. Department of Energy, Office of the Chief Financial Officer, "Budget Authority History Table by Appropriation" (Washington, DC, 1998); *U.S. Department of Energy Fiscal Year 1999 Budget Request*, DOE/CR-0050 (Washington, DC, February 1998); and *U.S. Department of Energy Fiscal Year 2000 Budget Request*, DOE/CR-0059 (Washington, DC, May 21, 1999).

**Table C2. U.S. Department of Energy Nuclear Power Research and Development Appropriations,
Fiscal Years 1978-1998**
(Million 1999 Dollars)

| Item | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--------------|--------------|--------------|--------------|
| New Nuclear Plants | | | | | | | | | | | |
| Nuclear Energy Research Initiative | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Nuclear Energy Plant Optimization | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Advanced Reactor R&D | 231.3 | 133.4 | 74.9 | 69.9 | 61.1 | 60.7 | 51.0 | 52.6 | 274.4 | 177.4 | 190.7 |
| University Reactor Fuel Help | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Breeder and Converter Reactors | 1,886.2 | 1,661.3 | 1,528.0 | 1,199.1 | 1,269.9 | 983.2 | 837.5 | 546.9 | 26.5 | 18.7 | 0.0 |
| Total New Reactors | 2,117.6 | 1,794.8 | 1,602.9 | 1,269.1 | 1,331.0 | 1,044.0 | 888.5 | 599.5 | 300.9 | 196.1 | 190.7 |
| Waste/Fuel/Safety | | | | | | | | | | | |
| Non-Defense Environmental Management .. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Uranium Programs | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Waste and Fuel Cycle Programs | 465.9 | 462.1 | 441.6 | 543.9 | 434.4 | 569.0 | 249.2 | 285.1 | 348.3 | 389.5 | 333.6 |
| Nuclear Safety | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Waste/Fuel/Safety | 465.9 | 462.1 | 441.6 | 543.9 | 434.4 | 569.0 | 249.2 | 285.1 | 348.3 | 389.5 | 333.6 |
| Unallocated | | | | | | | | | | | |
| Termination Costs | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Fast Flux Test Facility | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Program Direction and Management .. | 0.0 | 0.0 | 0.0 | 2.9 | 0.0 | 1.0 | 2.8 | 1.9 | 14.2 | 12.9 | 14.2 |
| Facilities and Facilities Management .. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 185.8 | 174.4 | 155.1 |
| Total Unallocated | 0.0 | 0.0 | 0.0 | 2.9 | 0.0 | 1.0 | 2.8 | 1.9 | 200.0 | 187.2 | 169.3 |
| Total Nuclear Power | 2,583.4 | 2,256.8 | 2,044.5 | 1,815.9 | 1,765.4 | 1,614.0 | 1,140.4 | 886.5 | 849.2 | 772.8 | 693.5 |

Sources: U.S. Department of Energy, Office of the Chief Financial Officer, "Budget Authority History Table by Appropriation" (Washington, DC, 1998); *U.S. Department of Energy Fiscal Year 1999 Budget Request*, DOE/CR-0050 (Washington, DC, February 1998); and *U.S. Department of Energy Fiscal Year 2000 Budget Request*, DOE/CR-0059 (Washington, DC, May 21, 1999).

**Table C1. Summary of U.S. Department of Energy Research and Development Expenditures,
Fiscal Years 1978-1999 (Continued)**
(Million 1999 Dollars)

| Item | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|--------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Renewable Energy | 187.7 | 169.5 | 235.9 | 275.8 | 284.2 | 351.8 | 395.2 | 296.0 | 271.8 | 295.8 | 327.2 |
| Nuclear Power | 775.8 | 775.1 | 955.0 | 1,131.7 | 1,082.0 | 1,027.8 | 1,022.5 | 803.5 | 859.3 | 654.9 | 639.6 |
| Fossil Energy | 481.1 | 505.0 | 541.3 | 515.0 | 475.6 | 420.3 | 396.9 | 390.8 | 373.2 | 354.9 | 384.1 |
| Conservation and End Use | 208.9 | 234.9 | 270.6 | 297.2 | 345.8 | 426.6 | 471.1 | 393.9 | 423.5 | 455.8 | 525.7 |
| Clean Coal Technology | 52.0 | 80.0 | 145.9 | 151.7 | 131.5 | 252.1 | 257.9 | 258.3 | 100.2 | 78.0 | 183.0 |
| Total | 1,705.5 | 1,764.4 | 2,148.7 | 2,371.4 | 2,319.2 | 2,478.6 | 2,543.6 | 2,142.5 | 2,028.1 | 1,839.4 | 2,059.6 |

**Table C2. U.S. Department of Energy Nuclear Power Research and Development Appropriations,
Fiscal Years 1978-1998 (Continued)**
(Million 1999 Dollars)

| Item | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|--|--------------|--------------|--------------|----------------|----------------|----------------|----------------|--------------|--------------|--------------|--------------|
| New Nuclear Plants | | | | | | | | | | | |
| Nuclear Energy Research Initiative | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 19.0 |
| Nuclear Energy Plant Optimization | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Advanced Reactor R&D | 164.7 | 100.1 | 126.1 | 139.1 | 130.0 | 103.4 | 111.6 | 43.1 | 58.6 | 0.0 | 0.0 |
| University Reactor Fuel Help | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.6 | 4.1 | 7.1 | 11.0 |
| Breeder and Converter Reactors | 10.8 | 70.2 | 113.5 | 82.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total New Reactors | 175.5 | 170.3 | 239.6 | 221.2 | 130.0 | 103.4 | 111.6 | 46.8 | 62.7 | 7.1 | 30.0 |
| Waste/Fuel/Safety | | | | | | | | | | | |
| Non-Defense Environmental Management .. | 0.0 | 357.1 | 520.9 | 695.9 | 788.9 | 752.4 | 780.6 | 643.8 | 584.5 | 469.2 | 431.2 |
| Uranium Programs | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 57.7 | 27.4 | 35.4 |
| Waste and Fuel Cycle Programs | 439.0 | 1.2 | 0.8 | 44.4 | 5.4 | 0.7 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| Nuclear Safety | 0.0 | 0.0 | 9.3 | 14.3 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Waste/Fuel/Safety | 439.0 | 358.3 | 531.1 | 754.6 | 795.4 | 753.1 | 781.3 | 643.8 | 642.3 | 496.6 | 466.6 |
| Unallocated | | | | | | | | | | | |
| Termination Costs | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 113.7 | 73.5 | 83.1 | 80.9 | 88.8 | 85.0 |
| Fast Flux Test Facility | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 42.7 | 30.4 | 30.0 |
| Program Direction and Management .. | 2.8 | 40.8 | 77.6 | 45.6 | 53.4 | 24.4 | 26.9 | 8.3 | 15.1 | 24.7 | 21.2 |
| Facilities and Facilities Management .. | 158.6 | 205.7 | 106.8 | 110.3 | 103.1 | 33.3 | 29.2 | 21.4 | 15.7 | 7.4 | 6.8 |
| Total Unallocated | 161.3 | 246.4 | 184.4 | 155.9 | 156.5 | 171.3 | 129.6 | 112.9 | 154.4 | 151.2 | 143.0 |
| Total Nuclear Power | 775.8 | 775.1 | 955.0 | 1,131.7 | 1,082.0 | 1,027.8 | 1,022.5 | 803.5 | 859.3 | 654.9 | 639.6 |

**Table C3. U.S. Department of Energy Fossil Energy Research and Development Appropriations,
Fiscal Years 1978-1999**
(Million 1999 Dollars)

| Item | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|---|----------------|----------------|----------------|----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Coal | | | | | | | | | | | |
| Advanced Power Systems | 483.0 | 465.5 | 389.8 | 286.7 | 193.1 | 137.6 | 145.4 | 164.4 | 146.1 | 112.5 | 142.4 |
| Advanced Clean Fuels | 750.6 | 713.5 | 724.8 | 725.8 | 472.8 | 128.5 | 107.2 | 91.6 | 109.1 | 70.1 | 70.1 |
| Advanced Research Technology | 245.0 | 275.4 | 313.0 | 248.8 | 150.2 | 99.6 | 107.0 | 108.2 | 93.2 | 96.4 | 97.3 |
| Total Coal | 1,478.6 | 1,454.4 | 1,427.6 | 1,261.4 | 816.1 | 365.7 | 359.6 | 364.2 | 348.4 | 279.1 | 309.8 |
| Clean Coal Technology Program | | | | | | | | | | | |
| Appropriations | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 139.0 | 202.3 | 260.9 |
| Outlays | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 9.5 | 33.9 |
| Petroleum and Synthetic Fuels | | | | | | | | | | | |
| Oil Shale | 64.5 | 100.4 | 51.1 | 55.6 | 31.1 | 19.1 | 24.1 | 21.3 | 17.2 | 15.0 | 12.6 |
| Other Petroleum Research | 111.8 | 108.0 | 65.6 | 44.3 | 32.9 | 17.9 | 21.3 | 24.8 | 24.1 | 20.6 | 26.5 |
| Total Petroleum and Synthetic Fuels .. | 176.3 | 208.4 | 116.7 | 99.9 | 64.0 | 37.0 | 45.4 | 46.0 | 41.2 | 35.6 | 39.0 |
| Natural Gas | | | | | | | | | | | |
| Fuel Cells | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other Natural Gas Research | 61.5 | 69.9 | 58.1 | 53.6 | 19.0 | 21.3 | 23.1 | 14.7 | 12.0 | 11.0 | 14.0 |
| Total Natural Gas | 61.5 | 69.9 | 58.1 | 53.6 | 19.0 | 21.3 | 23.1 | 14.7 | 12.0 | 11.0 | 14.0 |
| Unallocated | | | | | | | | | | | |
| Program Direction and Management | 0.0 | 0.0 | 0.0 | 0.0 | 22.4 | 60.8 | 69.3 | 82.7 | 80.4 | 85.4 | 102.7 |
| Cooperative Research and Development .. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Fuel Conversion | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other Unallocated | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Unallocated | 0.0 | 0.0 | 0.0 | 0.0 | 22.4 | 60.8 | 69.3 | 82.7 | 80.4 | 85.4 | 102.7 |
| Total Fossil Fuels | 1,716.4 | 1,732.7 | 1,602.4 | 1,414.9 | 921.6 | 484.9 | 497.4 | 507.7 | 482.4 | 420.6 | 499.4 |

Note: Clean Coal Technology Program outlays (rather than appropriations) are included in the total.

Sources: U.S. Department of Energy, Office of the Chief Financial Officer, "Budget Authority History Table by Appropriation" (Washington, DC, 1998); *U.S. Department of Energy Fiscal Year 1999 Budget Request*, DOE/CR-0050 (Washington, DC, February 1998); and *U.S. Department of Energy Fiscal Year 2000 Budget Request*, DOE/CR-0059 (Washington, DC, May 21, 1999).

**Table C3. U.S. Department of Energy Fossil Energy Research and Development Appropriations,
Fiscal Years 1978-1999 (Continued)**
(Million 1999 Dollars)

| Item | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Coal | | | | | | | | | | | |
| Advanced Power Systems | 143.1 | 161.9 | 168.0 | 166.4 | 134.3 | 54.9 | 93.1 | 82.5 | 69.3 | 73.3 | 87.7 |
| Advanced Clean Fuels | 70.3 | 71.9 | 68.9 | 57.1 | 52.9 | 44.6 | 22.1 | 20.1 | 16.2 | 15.8 | 15.5 |
| Advanced Research Technology | 94.7 | 102.6 | 102.7 | 91.8 | 75.9 | 80.6 | 57.4 | 67.9 | 22.9 | 17.5 | 19.9 |
| Total Coal | 308.1 | 336.5 | 339.6 | 315.3 | 263.1 | 180.1 | 172.6 | 170.5 | 108.3 | 106.6 | 123.1 |
| Clean Coal Technology Program | | | | | | | | | | | |
| Appropriations | 238.8 | 667.0 | 453.0 | 468.0 | 0.0 | 240.5 | 38.5 | 152.9 | 15.2 | (102.2) | (40.0) |
| Outlays | 52.0 | 80.0 | 145.9 | 151.7 | 131.5 | 252.1 | 257.9 | 258.3 | 100.2 | 78.0 | 183.0 |
| Petroleum and Synthetic Fuels | | | | | | | | | | | |
| Oil Shale | 13.4 | 11.0 | 20.4 | 6.7 | 6.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other Petroleum Research | 35.3 | 36.6 | 49.0 | 57.8 | 62.4 | 80.6 | 79.8 | 57.2 | 46.2 | 48.3 | 48.6 |
| Total Petroleum and Synthetic Fuels .. | 48.7 | 47.6 | 69.4 | 64.5 | 68.5 | 80.6 | 79.8 | 57.2 | 46.2 | 48.3 | 48.6 |
| Natural Gas | | | | | | | | | | | |
| Fuel Cells | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.6 | 3.8 | 49.9 | 39.6 | 44.2 |
| Other Natural Gas Research | 14.5 | 17.6 | 18.6 | 14.2 | 32.3 | 47.5 | 28.6 | 61.0 | 70.0 | 64.1 | 71.0 |
| Total Natural Gas | 14.5 | 17.6 | 18.6 | 14.2 | 32.3 | 47.5 | 33.2 | 64.8 | 119.9 | 103.7 | 115.2 |
| Unallocated | | | | | | | | | | | |
| Program Direction and Management | 109.8 | 93.3 | 95.2 | 90.6 | 83.6 | 84.3 | 77.1 | 69.7 | 70.3 | 67.7 | 69.5 |
| Cooperative Research and Development .. | 0.0 | 5.6 | 13.9 | 12.3 | 11.0 | 10.4 | 9.4 | 6.4 | 5.7 | 5.8 | 6.8 |
| Fuel Conversion | 0.0 | 3.2 | 3.5 | 3.5 | 3.4 | 3.2 | 3.2 | 2.8 | 2.2 | 2.2 | 2.2 |
| Other Unallocated | 0.0 | 1.3 | 1.0 | 14.6 | 13.7 | 14.1 | 21.6 | 19.3 | 20.5 | 20.7 | 18.6 |
| Total Unallocated | 109.8 | 103.4 | 113.6 | 121.1 | 111.8 | 112.1 | 111.3 | 98.3 | 98.7 | 96.3 | 97.1 |
| Total Fossil Fuels | 533.1 | 585.0 | 687.2 | 666.7 | 607.2 | 672.3 | 654.8 | 649.1 | 473.4 | 432.9 | 567.1 |

**Table C4. U.S. Department of Energy Renewable Energy Research and Development Appropriations,
Fiscal Years 1978-1999**
(Million 1999 Dollars)

| Item | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|---|----------------|----------------|----------------|----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Wind, Photovoltaic, and Other Solar | | | | | | | | | | | |
| Wind Power | 82.3 | 123.0 | 114.5 | 134.0 | 55.9 | 49.0 | 39.6 | 41.2 | 35.1 | 22.8 | 11.2 |
| Solar Photovoltaic | 142.4 | 214.5 | 283.7 | 262.1 | 120.3 | 90.3 | 75.4 | 79.4 | 57.1 | 55.3 | 46.0 |
| Concentrating (Thermal) Solar | 233.5 | 203.1 | 285.9 | 239.0 | 91.0 | 77.1 | 65.6 | 49.2 | 36.2 | 31.3 | 22.3 |
| Solar Buildings | 276.9 | 262.5 | 160.5 | 132.1 | 35.9 | 18.1 | 24.6 | 13.3 | 11.6 | 8.1 | 7.1 |
| International Solar | 0.0 | 0.0 | 0.0 | 18.7 | 6.5 | 15.6 | 0.8 | 0.7 | 1.4 | 1.0 | 1.0 |
| Ocean Thermal (OTEC) | 80.7 | 85.0 | 81.3 | 59.8 | 33.8 | 16.4 | 8.2 | 5.8 | 6.8 | 6.1 | 5.3 |
| Other Solar | 0.0 | 0.0 | 0.0 | 0.0 | 16.5 | 6.2 | 6.0 | 8.9 | 5.6 | 4.3 | 5.6 |
| Total Wind and Solar | 815.8 | 888.1 | 926.0 | 845.6 | 360.0 | 272.7 | 220.3 | 198.6 | 153.6 | 128.9 | 98.5 |
| Biomass and Biofuels | | | | | | | | | | | |
| Biofuels | 47.5 | 87.6 | 104.0 | 85.8 | 49.6 | 32.7 | 42.5 | 43.6 | 38.2 | 32.9 | 22.4 |
| Hydrogen Fuels | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Alcohol Fuels (Solar) | 0.0 | 0.0 | 41.6 | 31.1 | 16.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Biomass/Biofuels | 47.5 | 87.6 | 145.6 | 116.9 | 65.8 | 32.7 | 42.5 | 43.6 | 38.2 | 32.9 | 22.4 |
| Geothermal | 242.1 | 302.0 | 282.2 | 269.7 | 113.7 | 89.8 | 45.5 | 43.1 | 37.5 | 28.5 | 27.5 |
| Hydropower | 23.4 | 80.9 | 39.6 | 5.5 | 4.9 | 3.1 | 1.1 | 0.6 | 0.7 | 0.6 | 0.0 |
| Electricity Technologies | | | | | | | | | | | |
| Electric Energy Systems and Storage | 208.6 | 204.8 | 195.5 | 193.1 | 97.2 | 66.8 | 66.0 | 55.7 | 40.4 | 38.2 | 39.2 |
| Federal Buildings | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Electricity Technologies | 208.6 | 204.8 | 195.5 | 193.1 | 97.2 | 66.8 | 66.0 | 55.7 | 40.4 | 38.2 | 39.2 |
| Unallocated | | | | | | | | | | | |
| Program Direction (Solar) | 19.2 | 20.8 | 8.6 | 14.2 | 26.5 | 9.1 | 9.0 | 7.1 | 6.4 | 5.6 | 5.6 |
| Renewable Indian Resources | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| NREL/SERI ^a | 0.0 | 6.2 | 18.9 | 8.6 | 0.0 | 0.0 | 0.0 | 0.0 | 3.2 | 0.7 | 0.8 |
| Renewables Policy and Management | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Unallocated | 19.2 | 27.0 | 27.5 | 22.8 | 26.5 | 9.1 | 9.0 | 7.1 | 9.6 | 6.4 | 6.4 |
| Total Renewable Energy | 1,356.5 | 1,590.5 | 1,616.3 | 1,453.6 | 668.1 | 474.2 | 384.4 | 348.8 | 280.0 | 235.5 | 193.9 |

^aSERI = Solar Energy Research Institute. NREL = National Renewable Energy Laboratory.

Sources: U.S. Department of Energy, Office of the Chief Financial Officer, "Budget Authority History Table by Appropriation" (Washington, DC, 1998); *U.S. Department of Energy Fiscal Year 1999 Budget Request*, DOE/CR-0050 (Washington, DC, February 1998); and *U.S. Department of Energy Fiscal Year 2000 Budget Request*, DOE/CR-0059 (Washington, DC, May 21, 1999).

**Table C4. U.S. Department of Energy Renewable Energy Research and Development Appropriations,
Fiscal Years 1978-1999 (Continued)**
(Million 1999 Dollars)

| Item | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Wind, Photovoltaic, and Other Solar | | | | | | | | | | | |
| Wind Power | 11.1 | 10.6 | 13.0 | 24.3 | 26.5 | 31.7 | 47.3 | 32.7 | 29.3 | 32.5 | 34.8 |
| Solar Photovoltaic | 44.7 | 41.8 | 54.4 | 68.5 | 72.1 | 81.3 | 88.0 | 63.8 | 60.6 | 65.5 | 72.2 |
| Concentrating (Thermal) Solar | 18.8 | 19.5 | 22.5 | 32.8 | 30.0 | 34.1 | 31.9 | 25.0 | 22.4 | 16.5 | 17.0 |
| Solar Buildings | 6.7 | 4.7 | 2.3 | 2.3 | 3.3 | 5.2 | 4.6 | 2.0 | 2.6 | 2.7 | 3.6 |
| International Solar | 1.3 | 1.3 | 1.7 | 2.3 | 2.2 | 5.5 | 9.5 | 4.0 | 0.8 | 1.4 | 6.4 |
| Ocean Thermal (OTEC) | 5.2 | 4.7 | 3.1 | 2.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other Solar | 5.2 | 4.1 | 4.8 | 3.5 | 4.6 | 29.9 | 32.6 | 13.9 | 0.0 | 0.0 | 0.0 |
| Total Wind and Solar | 93.1 | 86.8 | 101.9 | 135.9 | 139.8 | 188.7 | 213.9 | 141.5 | 115.6 | 118.6 | 133.9 |
| Biomass and Biofuels | | | | | | | | | | | |
| Biofuels | 16.8 | 21.1 | 38.8 | 44.5 | 53.4 | 60.6 | 57.7 | 55.4 | 56.6 | 58.8 | 73.2 |
| Hydrogen Fuels | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.4 | 9.4 | 14.9 | 15.1 | 16.0 | 22.3 |
| Alcohol Fuels (Solar) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Biomass/Biofuels | 16.8 | 21.1 | 38.8 | 44.5 | 53.4 | 71.0 | 67.0 | 70.3 | 71.7 | 74.8 | 95.5 |
| Geothermal | 24.6 | 20.9 | 35.1 | 30.7 | 25.8 | 25.0 | 43.9 | 30.6 | 30.3 | 29.0 | 28.5 |
| Hydropower | 0.0 | 0.0 | 1.2 | 1.2 | 1.2 | 1.1 | 5.1 | 3.6 | 1.0 | 0.7 | 3.3 |
| Electricity Technologies | | | | | | | | | | | |
| Electric Energy Systems and Storage | 46.8 | 34.8 | 47.8 | 42.9 | 47.0 | 48.0 | 45.2 | 35.1 | 32.5 | 43.8 | 40.1 |
| Federal Buildings | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.9 | 4.0 |
| Total Electricity Technologies | 46.8 | 34.8 | 47.8 | 42.9 | 47.0 | 48.0 | 45.2 | 35.1 | 32.5 | 48.7 | 44.1 |
| Unallocated | | | | | | | | | | | |
| Program Direction (Solar) | 5.6 | 5.1 | 5.1 | 5.3 | 6.5 | 7.6 | 8.7 | 0.0 | 13.3 | 15.8 | 18.1 |
| Renewable Indian Resources | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 4.8 | 0.0 |
| NREL/SERI ^a | 0.8 | 0.8 | 6.1 | 13.1 | 7.3 | 6.3 | 6.3 | 2.1 | 3.4 | 3.2 | 3.9 |
| Renewables Policy and Management | 0.0 | 0.0 | 0.0 | 2.2 | 3.2 | 4.1 | 5.1 | 12.7 | 0.0 | 0.0 | 0.0 |
| Total Unallocated | 6.4 | 5.8 | 11.1 | 20.6 | 17.0 | 17.9 | 20.1 | 14.8 | 20.8 | 23.9 | 22.0 |
| Total Renewable Energy | 187.7 | 169.5 | 235.9 | 275.8 | 284.2 | 351.8 | 395.2 | 296.0 | 271.8 | 295.8 | 327.2 |

Appendix D

Bibliography